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14-MAY-2023

ANALYSIS

Cong

Congress impro
2018 to 135 in 22

Nagesh Prabhu
BENGALURU

Sending out a clear signal for change, Karnataka voters have defeated the incumbent Bharatiya Janata Party (BJP) and given the Congress an unambiguous mandate, with 135 seats in the 224-member Legislative Assembly.

The acid test for the Congress will now be to

Results at a glance

DailyEpaper.in

Cong. to meet today scuss next step

ureau

The MLAs-elect of the Congress will meet in Bengaluru at 5.30 p.m. on Sunday.

The meeting of the MLAs-elect on the chief ministerial candidate, which is a key question the party has to wrestle with. Congress president Mallikarjun Kharge said the party's victory had brought a new energy

N BRIEF

Karnataka result not surprising, says Assam CM

GUWAHATI
Assam CM Himanta Biswa Sarma on Saturday said the Karnataka Assembly election result was not surprising and that the BJP had won most of the seats he visited during campaigning. » Page 6

1. U.K. sees success in mitochondrial replacement therapy
2. Groundwater exploitation is silently sinking the ground beneath India’s feet
3. Study on butterflies’ migration opens door for conservation

Prelims Bytes

4. NCB and Navy make biggest seizure of drugs in India
5. Kalangummukal becomes Kerala’s first fully insured ward
6. Gaganyaan: parachutes for re-entry capsule sent to ISRO facility in Bengaluru

U.K. sees success in mitochondrial replacement therapy

U.K. sees success in mitochondrial replacement therapy

R. Prasad

Eight years after the U.K. became the first country in the world to approve a reproductive technique known as mitochondrial replacement therapy (MRT), "less than five" children have been born using the procedure, as of April 2023.

The Human Fertilisation and Embryology Authority (HFEA), the U.K. fertility regulator that approves the IVF-based procedure on a case-by-case basis, recently confirmed this in response to a freedom of information request. The fertility regulator refused to share more information about the birth details of the children as that "could lead to the identification of a person to whom the HFEA owes a duty of confidentiality".

Last year, Australia became the second country to approve this therapy.

The mitochondrial replacements in "less than five" children were carried out by the Newcastle Fertility Centre, U.K., the only clinic that has been approved by the regulator to conduct this therapy.

Three-parent IVF

Mitochondria replacement involves transferring nuclear genetic material from a mother's egg into a donor egg that has had its nuclear DNA removed so the embryo does not inherit the mitochondrial disease. This would allow a woman carrying mitochondrial diseases to have healthy children. The resulting IVF embryo combines sperm and egg from the biological parents, while the mitochondria is from the donor's egg.

As a result, the baby has DNA from each of its parents, along with 37 genes from the donor. This is the reason why this technique is also called three-parent IVF (in vitro fertilisation).

According to the HFEA, one in 6,500 babies in the U.K. is born with a mitochondrial disorder which can lead to serious problems such as heart and liver disease, and respiratory problems, which can even lead to the death of the infant.

Life-saver

The Authority said, in 2013, that this procedure can save around 10 lives each year in the U.K.

Mitochondria is the powerhouse of a cell, and any mutation that damages the mitochondria tends to affect energy-hungry organs the most.

As of 2013, about 12,000 people in the U.K. live with such conditions, the reason why the therapy was approved by the HFEA.

In the U.S., 1,000-4,000 babies with mitochondrial disease are born each year.

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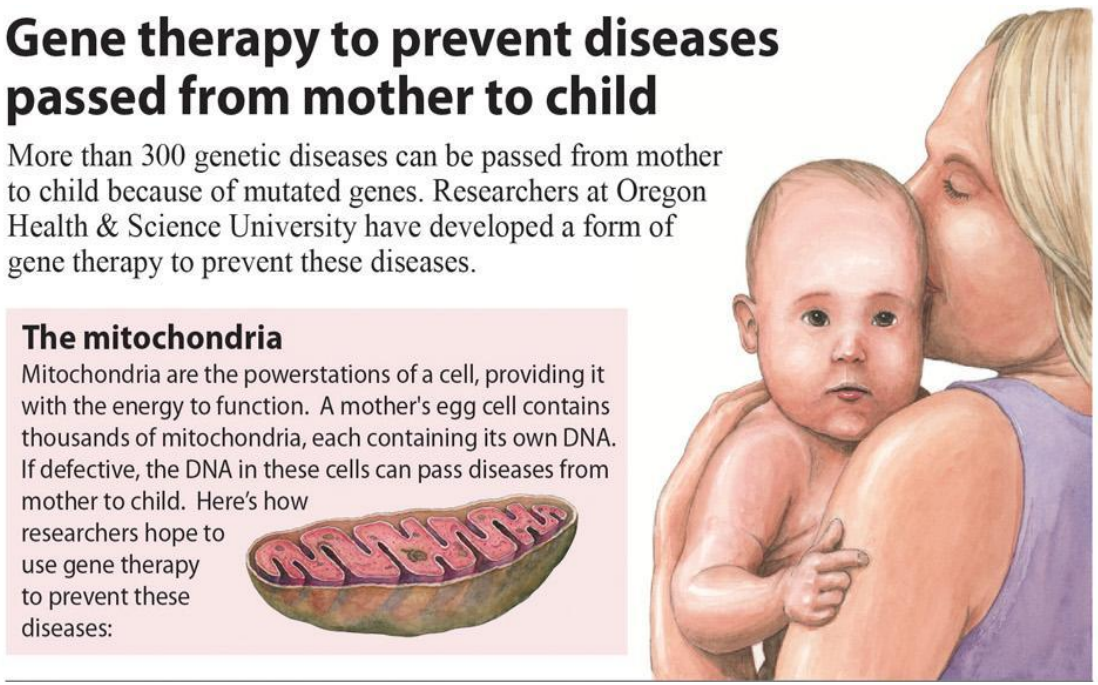
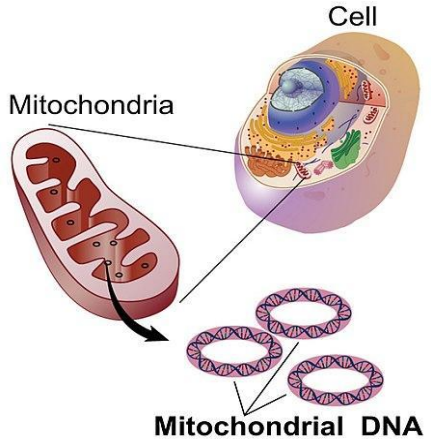
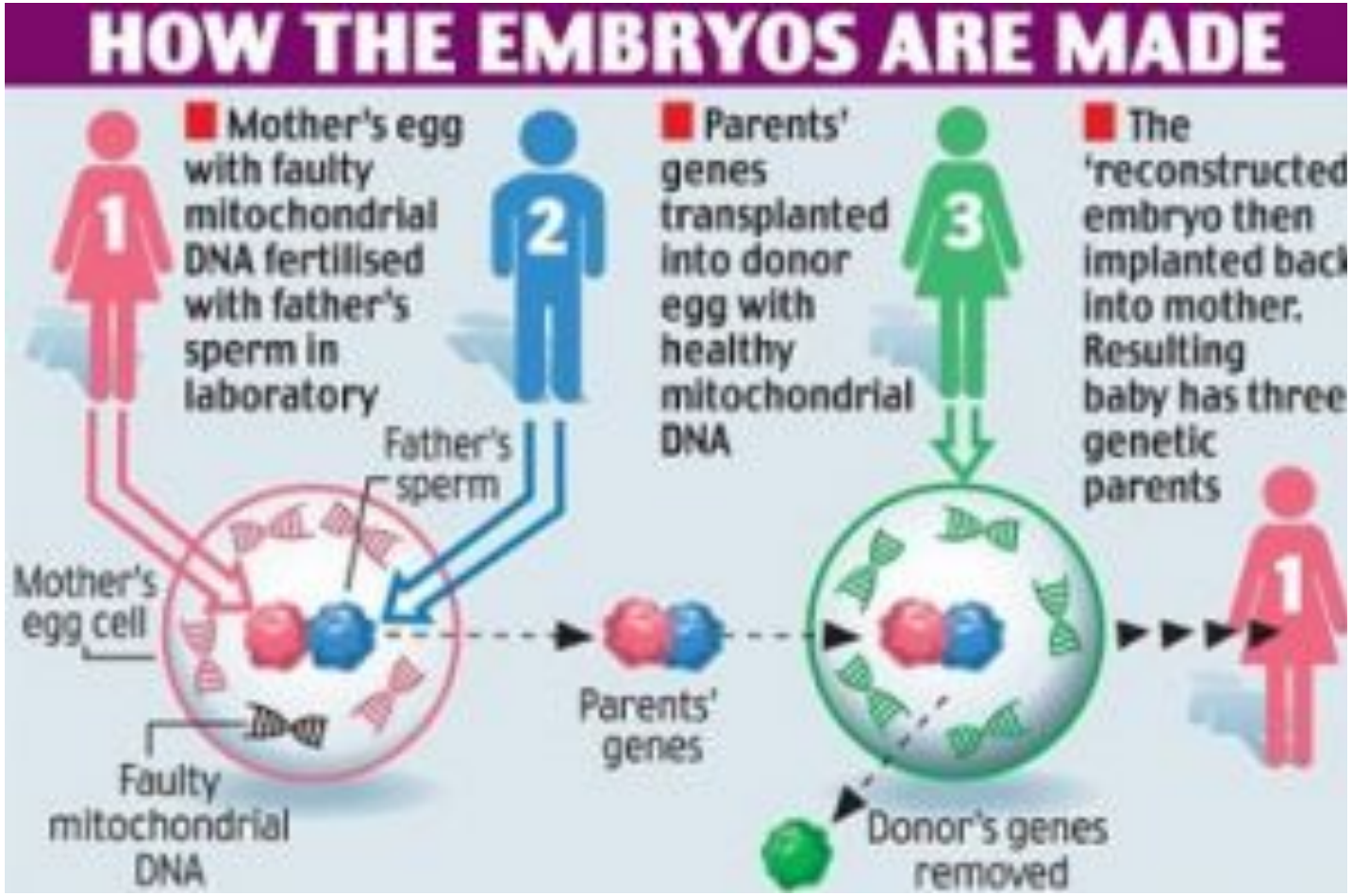
(MRT), "less than five" children have been born using the procedure, as of April 2023. Last year, Australia became the second country to approve this therapy.

- “Mitochondria are membrane-bound organelles present in the cytoplasm of all eukaryotic cells, that produce adenosine triphosphate (ATP), the main energy molecule used by the cell.”


Gene therapy to prevent diseases passed from mother to child
More than 300 genetic diseases can be passed from mother to child because of mutated genes. Researchers at Oregon Health & Science University have developed a form of gene therapy to prevent these diseases.
The mitochondria
Mitochondria are the powerstations of a cell, providing it with the energy to function. A mother's egg cell contains thousands of mitochondria, each containing its own DNA. If defective, the DNA in these cells can pass diseases from mother to child. Here's how researchers hope to use gene therapy to prevent these diseases:




HOW THE EMBRYOS ARE MADE
1
Mother's egg with faulty mitochondrial DNA fertilised with father's sperm in laboratory
2
Father's sperm
Mother's egg cell
Faulty mitochondrial DNA
Parents' genes
3
Parents' genes transplanted into donor egg with healthy mitochondrial DNA
Donor's genes removed
The 'reconstructed embryo then implanted back into mother. Resulting baby has three genetic parents
1

The Process

- Mitochondria replacement involves transferring nuclear genetic material from a mother's egg into a donor egg that has had its nuclear DNA removed so the embryo does not inherit the mitochondrial disease. This would allow a woman carrying mitochondrial diseases to have healthy children. The resulting IVF embryo combines sperm and egg from the biological parents, while the mitochondria is from the donor's egg.

- As a result, the baby has DNA from each of its parents, along with 37 genes from the donor. This is the reason why this technique is also called three-parent IVF (in vitro fertilisation).

- According to the HFEA- The Human Fertilisation and Embryology Authority (HFEA), the U.K. fertility regulator- one in 6,500 babies in the U.K. is born with a mitochondrial disorder which can lead to serious problems such as heart and liver disease, and respiratory problems, which can even lead to the death of the infant.

Conclusions

- The Authority said, in 2013, that this procedure can save around 10 lives each year in the U.K.

- In the U.S., 1,000-4,000 babies with mitochondrial disease are born each year.

- Potentiality

Groundwater exploitation is silently sinking the ground beneath India's feet

Groundwater exploitation is silently sinking the ground beneath India's feet

Jacob Koshy
NEW DELHI

Source of worry: Farmers survey a dry well in Fatehpur village of Patiala district in Punjab.. FILE PHOTO

Cracks in buildings and 'sinking' land in Joshimath, a hill town in Uttarakhand, made national headlines earlier this year. A similar phenomenon has been playing out for years in the plains of Punjab, Haryana, Delhi and Faridabad. The unlikely culprit is excessive groundwater extraction.

Agricultural practices in north-west India are heavily dependent on groundwater withdrawal. With limited monsoon rain, the groundwater table is precariously low, show data gathered for years by the Central Ground Water Board (CGWB).

In Punjab, for instance, 76% of the groundwater blocks are 'over exploited'. In Chandigarh, it is 64% and about 50% in Delhi. This means that more groundwater than can be recharged is extracted. "Over time, when the underlying aquifers (deep water channels that are stores of percolated water) aren't recharged, they run dry and the layers of soil and rock above them start to sink," Prof. Dheeraj Kumar Jain of the Indian Institute of Technology (Indian School of Mines), Dhanbad, said.

Mr. Jain, whose core research interests lie in mining and minerals, said digging operations that were carried out hundreds of metres below the ground for coal, oil and gas through the years had shown examples of 'soil settlement,' or the soil sinking in to fill voids created from mining.

"From here we surmised that if oil and gas extraction cause subduction (sinking), then surely groundwater also ought to be playing some role. We found such instances in several parts of the world and that motivated some of my students to assess the situation in India, particularly the National Capital Territory."

The CGWB, a subsidiary body of the Jal Shakti Ministry, is tasked with assessing the state of India's groundwater resources. It has a system of groundwater observation-wells and monitors water levels four times a year. It, however, does not analyse the consequences of 'over exploitation.'

"The link between excessive groundwater extraction and land subsidence only started to become clear, thanks to data from the GRACE (Gravity Recovery and Climate Experiment) satellites," V.K. Gahlaut, chief scientist, National Geophysical Research Institute (NGRI), Hyderabad, said.

Mr. Gahlaut earlier published a research paper linking groundwater extraction to subsidence in Gandhinagar, Gujarat, an evidence that the issue was not specific to north India alone.

A wealth of studies in recent years, all of them obtained from satellite-based analysis of ground movement, from institutions and researchers that specialise in satellite-data analysis have correlated building deformities with groundwater withdrawals.

Kapil Malik, a research scholar who worked with Mr. Jain and runs the Noida-based Radar System and Services, used data from the Sentinel-1 satellite (different from GRACE) to show that from 2011-2017, the National Capital Region sunk, on an average, 15 mm per year. Urbanisation and unplanned growth were major factors, said Mr. Malik and this exacerbated groundwater withdrawal.

Parts of Delhi-NCR that saw subsidence were far away from tectonic (earthquake-linked) fault lines

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The Core Issue

- Agricultural practices in north-west India are heavily dependent on groundwater withdrawal.

- With limited monsoon rain, the groundwater table is precariously low, show data gathered for years by the Central Ground Water Board (CGWB).

- In Punjab, for instance, 76% of the groundwater blocks are ‘over exploited’. In Chandigarh, it is 64% and about 50% in Delhi. This means that more groundwater than can be recharged is extracted.

- “Over time, when the underlying aquifers (deep water channels that are stores of percolated water) aren’t recharged, they run dry and the layers of soil and rock above them start to sink

The Overall Picture and Way Forward

- If Oil and gas extraction cause subduction (sinking), then surely groundwater also ought to be playing some role. We found such instances in several parts of the world and that motivated some of my students to assess the situation in India, particularly the National Capital Territory

Study on butterflies' migration opens door for conservation

Study on butterflies' migration opens door for conservation

E.M. Manoj
KALPETTA

Millions of milkweed butterflies undertake a migration between the Eastern and the Western Ghats in southern India, seeking refuge from the harsh summer.

This spectacular ecological phenomenon had been recorded more than a century ago but received little research and conservation attention until recently. However, a recent study by a team of researchers has shed light on the migration patterns of milkweed butterflies in southern India, which has the potential to contribute to the conservation of these butterflies and their migration in the face of ongoing changes in land use, habitat degradation, and climate warming.

Winged beauties: (From left) Striped tiger, Blue tiger, Dark blue tiger and Plain tiger. SPECIAL ARRANGEMENT

The study was published in the recent issue of the *Journal of Insect Conservation*. After southwest monsoon, milkweed butterflies migrate westward from the Eastern Ghats and plains to the Western Ghats, becoming active for more than two months upon their arrival.

Between October and April, most of the milkweed butterflies in the Western Ghats congregate in large numbers at specific sites during winter and dry seasons. When the summer rain cools southern India, the butterflies migrate eastwards into the Eastern Ghats and the plains.

Battered wings

The studies reveal that the wings of the majority of butterflies during their eastward journey are battered than that in the westward migration.

Also, the researchers found that the dominant species involved in the migration, Dark blue tiger and Double-branded crow, are not found breeding in the mid and high-altitude evergreen and semi-evergreen forests of the Western Ghats.

P.A. Vinayan, who led the study, says the adults of Dark blue tiger and Double-branded crow that arrived in the Western Ghats may be migrating reversely and breeding in the Eastern Ghats and the plains of southern India. However, further studies are needed to confirm the finding, says Mr. Vinayan, who is also the president of the Ferns Nature Conservation Society.

Vital role

"The migration of milkweed butterflies also plays a vital ecological role during the migration. As pollinators, their movements can impact entire ecosystems. Their migration is threatened by habitat destruction and climate change. Studying their migration patterns and feeding habits can throw light on the interconnectedness of plant and animal life. By unravelling the mysteries of their migration, we can help protect these beautiful creatures and their ecosystems," says Mr. Vinayan.

"The Ferns society has begun tagging these migrating butterflies. Our hope is that their long-term monitoring of these tagged individuals will reveal more about the darker aspects of their migration," he says.

M.A. Yedhumon, researcher, Wildlife Institute of India, Dehradun; M.R. Anoop, researcher, Ashoka Trust for Research in Ecology and the Environment, Bengaluru; and N.S. Sujin, researcher, The Sálim Ali Centre for Ornithology and Natural History, Comibatore; were the other members of the team.

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Millions of milkweed butterflies undertake a migration between the Eastern and the Western Ghats in southern India, seeking refuge from the harsh summer.

The Study

- A recent study by a team of researchers has shed light on the migration patterns of milkweed butterflies in southern India, which has the potential to contribute to the conservation of these butterflies and their migration in the face of ongoing changes in land use, habitat degradation, and climate warming.

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Significance

- The migration of milkweed butterflies also plays a vital ecological role during the migration.

- As pollinators, their movements can impact entire ecosystems. Their migration is threatened by habitat destruction and climate change.

- Studying their migration patterns and feeding habits can throw light on the interconnectedness of plant and animal life. By unravelling the mysteries of their migration, we can help protect these beautiful creatures and their ecosystems

Prelims Bytes

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NCB and Navy make biggest seizure of drugs in India

- In what is claimed to be the biggest ever drug seizure in terms of monetary value by any anti-drug enforcement agency in the country, the Narcotics Control Bureau (NCB) and the Indian Navy, in a joint operation off the Kerala coast, have seized around 2,500 kg of methamphetamine valued at around ₹15,000 crore and originating from Pakistan.

- The seizure is part of Operation Samudragupt targeting maritime trafficking of drugs aimed at making the Indian Ocean region free of narcotics.

- The drugs had its origin in Pakistan and was loaded to the mother ship from the Makran coast. Officials have seized 134 sacks of suspected methamphetamine. The sacks had Pakistani inscriptions. The drugs, the detained person, and other items salvaged from the ship have been brought to the Mattancherry wharf in Kochi and handed over to the NCB for further action.

Kalangummukal becomes Kerala's first fully insured ward

- Kalangummukal is a nondescript rural pocket in Kollam district of Kerala, mostly populated by underprivileged families. But now it will be State's first fully insured ward as its 1,382 residents in the 5-70 age group have been provided insurance coverage against accidental death and disability.

- At present, the dependents of any policyholder will get ₹1 lakh in case of accidental death.

- Those with permanent or partial disability will get financial assistance up to a maximum of ₹1 lakh based on the percentage of disability.

Gaganyaan: parachutes for re-entry capsule sent to ISRO facility in Bengaluru

- Indigenously developed parachutes for the safe return of the capsule that will carry astronauts under the proposed Gaganyaan programme are set to undergo fitment tests at an Indian Space Research Organisation (ISRO) facility in Bengaluru in July.

- The Aerial Delivery Research and Development Establishment (ADRDE), the Agra-based laboratory under the Defence Research and Development Organisation (DRDO), has developed the parachutes for India's manned space flight programme, Gaganyaan, which envisages putting a crew of three astronauts in low-earth orbit.

- The parachute configuration consists of 10 parachutes.

Mains Questions

Q1. What is mitochondrial replacement therapy? Discuss the potentiality of this therapy? (150 words, 10 marks)

Q2. “Overexploitation of groundwater resources is the next man-made disaster waiting to happen” Comment? (150 words, 10 marks)

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